

WHAT IS CLAIMED IS:

1. An automobile including an internal combustion engine capable of outputting a power to a drive shaft comprising:

5 a target power setting device that sets a target power to be output by the internal combustion engine or a target operating point based on a power requirement to be output to the drive shaft and a characteristic of an efficiency with respect to an output of the internal combustion engine;

10 an operation control device that controls operation of the internal combustion engine such that the internal combustion engine is operated with the target power or at the target operating point that has been set; and

a power input/output/consumption device that inputs, outputs, or consumes a power which is equivalent to a difference between the power requirement and either one of the target power and a power corresponding to the target operating point.

15 2. The automobile according to claim 1, wherein the power input/output/consumption device includes an auxiliary device that is operated by using at least a part of the power from the internal combustion engine directly or indirectly, and an auxiliary device control device that controls operation of the
20 auxiliary device.

3. The automobile according to claim 2, wherein the target power setting device further sets the target power or the target operating point based on an operation requirement of the auxiliary device.

25 4. The automobile according to claim 1, wherein the target power setting device sets the target power or the target operating point such that an efficiency with respect to the output power of the internal combustion engine is within a predetermined tolerance range.

30 5. The automobile according to claim 1, wherein the target power setting device sets the target power or the target operating point based on a characteristic of a change in efficiency with respect to a change in the output power of

the internal combustion engine, as a characteristic of the efficiency with respect to the output power of the internal combustion engine.

5 6. The automobile according to claim 5, wherein the target power setting device sets the target power or the target operating point such that the internal combustion engine is operated within an output range in which a degree of change in the efficiency with respect to a change in the output power of the internal combustion engine is small.

10 7. The automobile according to claim 5, wherein the target power setting device sets a predetermined power or a predetermined target operating point regardless of the power requirement, when the target power which has been set based on the power requirement or a power corresponding to the target operating point that has been set is within an output range in which a degree of change in the efficiency
15 with respect to a change in the output power of the internal combustion engine is large.

 8. The automobile according to claim 7, wherein
the predetermined power or the predetermined operating point is set to a power or an
20 operating point when the efficiency of the internal combustion engine has reached a predetermined high level.

 9. The automobile according to claim 3, wherein:
the target power setting device sets the target power or the target operating
25 point based on a characteristic of a change in efficiency with respect to a change in output power of the internal combustion engine, as a characteristic of the efficiency with respect to the output power of the internal combustion engine; and
the target power setting device sets a predetermined power or a predetermined
operating point regardless of the power requirement and the operation requirement of
30 the auxiliary device, when the target power which has been set based on the power requirement and the operation requirement of the auxiliary device or a power corresponding to the target operating point that has been set is within a range where a degree of a change in efficiency with respect to the change in output power of the internal combustion engine is large.

10. The automobile according to claim 9, wherein the predetermined power or the predetermined operating point is set to a power or an operating point when the efficiency of the internal combustion engine has reached a predetermined high level.

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11. The automobile according to claim 3, wherein:
the target power setting device sets the target power or the target operating point such that the internal combustion engine is operated in an output range where a degree of a change in efficiency with respect to a change in output power of the internal combustion engine is small; and

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the target power setting device sets a predetermined power or a predetermined operating point regardless of the power requirement and the operation requirement of the auxiliary device, when the target power that has been set based on the power requirement and the operation requirement of the auxiliary device or a power corresponding to the target operating point is within an output range where a degree of a change in efficiency with respect to a change in output power of the internal combustion engine is large.

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12. The automobile according to claim 11, wherein the predetermined power or the predetermined operating point is set to a power or an operating point when the efficiency of the internal combustion engine has reached a predetermined high level.

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13. The automobile according to claim 2, wherein:
the auxiliary device includes a secondary battery capable of obtaining an electric power which is generated by converting a part of the power from the internal combustion engine; and

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the auxiliary device control device includes a device to control inputting and outputting of the electric power of the secondary battery.

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14. The automobile according to claim 3, wherein:
the auxiliary device includes a secondary battery capable of obtaining an electric power which is generated by converting a part of the power from the internal combustion engine;

the auxiliary device control device includes a device to control inputting and outputting of the electric power of the secondary battery; and

the operation requirement of the auxiliary device includes a charge requirement of the secondary battery.

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15. The automobile according to claim 14, further comprising:

a state of charge detecting device that detects a state of charge of the secondary battery, wherein

the charge requirement of the secondary battery is executed based on a detected state of charge of the secondary battery.

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16. The automobile according to claim 1 further comprising:

a power transmission conversion mechanism capable of transmitting a part of the power from the internal combustion engine to the drive shaft, and capable of converting a remaining power to an electric power so as to supply the electric power to the power input/output/consumption device.

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17. The automobile according to claim 14, wherein:

the power transmission conversion mechanism includes a generator that generates an electric power due to an input of the power from the internal combustion engine, and a three-axes type power input/output mechanism that has a first axis connected to an output shaft of the internal combustion engine, a second axis and a third axis each connected to a rotational axis of a generator, and the power which is input to and output from any two axes of the first axis, the second axis and the third axis determines the power which is input to and output from the remaining axis; and the automobile includes an electric motor capable of outputting a power directly to the third axis.

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18. An automobile including an internal combustion engine capable of outputting a power to a drive shaft, comprising:

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target power setting means for setting a target power to be output by the internal combustion engine or a target operating point based on a power requirement to be output to the drive shaft and a characteristic of an efficiency with respect to an output of the internal combustion engine;

operation control means for controlling operation of the internal combustion engine such that the internal combustion engine is operated with the target power or at the target operating point that has been set; and

5 power input/output/consumption means for inputting, outputting, or consuming a power which is equivalent to a difference between the power requirement and either one of the target power and a power corresponding to the target operating point.

19. A controlling method for an automobile including an internal
10 combustion engine capable of outputting a power to a drive shaft, comprising the steps of:

setting a target power to be output by the internal combustion engine or a target operating point based on a power requirement to be output to the drive shaft and a characteristic of an efficiency with respect to an output of the internal
15 combustion engine;

controlling operation of the internal combustion engine such that the internal combustion engine is operated with the target power or at the target operating point that has been set; and

inputting, outputting, or consuming a power which is equivalent to a
20 difference between the power requirement and either one of the target power and a power corresponding to the target operating point.